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Huddled Within *Chadars*, Moslem Women Brave Tehran's Winter—Iran's lofty capital rises near the snowy Elburz Mountains. A horse-drawn *droshky* contrasts with modern buildings and wide paved avenue in this 12th-century city, home to a million Iranians. Temperatures range from winter's sub-zero to 100-plus in summer.

(SEE PAGE 102)

MAYNARD OWEN WILLIAMS

matted ribbon of prairie sod. About the same time axes rang out in the north woods and pines crashed near camps where the mythical Paul Bunyan reached his prime. More and more Finns, Swedes, Norwegians, Danes staked out homesteads. In 1858 the new Territory of Minnesota became the 32nd State in the Union. Germans, Irish, Bohemians poured in.

Scandinavians chose the north and central plains to start dairy farms and grow wheat, corn, flax, barley, and rye. Dutchmen farmed best on the swamplands. The French preferred the St. Croix Valley and the Mississippi caves where roquefort cheese could be ripened. Baltic fishermen grew rich on Lake Superior, Hiawatha's Gitche Gumee.

Olafson and his neighbors organized cooperatives like those of the old country. So successful were they that today Minnesota still counts more cooperatives than any other State. Fisheries, utilities, dairying, everything from bookstores to burials, are cooperative ventures.

Olafson read to his sons the Declaration of Independence in Norwegian. Soon they were teaching it to him in English. On long winter evenings they discussed politics and Jeffersonian democracy. Minnesota became a leader in labor legislation.

Leonidas Merritt, struggling along Mesabi Range in northeast Minnesota with ax and compass, discovered iron ore, some of it 60 percent pure. Andrew Carnegie smelled a bonanza, talked Leonidas out of the rights and in a few years Poles, Italians, Croatians were pouring in. They dug the largest open-pit mine on earth. In 50 years this yielded more than a billion tons. Today it accounts for 70 percent of the nation's annual iron-ore production. Fear of exhausting the supply has changed mining practices. New techniques isolate iron, through beneficiation, from taconite, low-grade ore previously ignored.

Yankees as well as immigrants built Minnesota. Colonel Josiah Snelling, seeking to lower commissary costs at Fort St. Anthony in 1823,

A Fleet Formation of Combines Rides High on Minnesota's Seas of Golden Grain

NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER

Minnesotans Turn Wilderness into Democracy

Into the wilds of Minnesota came the Olafson family 100 years ago. They brought with them a Lutheran Bible, a Scandinavian love for cooperation, and some oat seeds sewn into the lining of papa's coat.

The Olafsons spoke no English but they managed to board the right trains from New York to Galena, Illinois, where in 1854 the railroad ended. A Mississippi River steamboat took them north to the Falls of St. Anthony, future site of the twin cities Minneapolis and St. Paul. And now they would ride a creaking two-wheeled oxcart across the prairie to lands recently vacated by the Sioux Indians.

April's last snow flurry felt like home, but the prairies seemed as boundless as the ocean they had crossed. Little Thor was scared, Hels too sick to care, and the baby strangely quiet. Mama and papa Olafson gazed upon a region unchanged since the French fur traders Radisson and Groseilliers first saw it 200 years before.

This was new land, alien to ax and plow. North stretched the "Big Woods"—great forests of hardwoods, white Norway pine and jackpine—broken by sparkling lakes and bordering Lake Superior. Hiawatha might still be treading the primeval paths. With spear and arrow Indians hunted the muskrat, lynx, bobcat, beaver, and deer. The noiseless dip of their paddles did not break the silence of a virgin land.

Then sounds of progress filled the empty spaces as the Olafsons yoked their oxen to a plow and turned the first

NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER

Symbol of Democracy—Minnesota's capitol at St. Paul spells unity and representative government to people of diverse background.

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First Apple Polisher Lived 4,000 Years Ago

The first "apple polisher" in recorded history was a Sumerian schoolboy who, some 2,000 years before the Christian era began, buttered up his teacher with a home-cooked meal.

Dr. Samuel Noah Kramer, curator of the clay writing tablet collection in the University of Pennsylvania Museum and the university's professor of Assyriology, unearthed the story as he pored over cuneiform symbols graven on clay tablets dug up in Iraq.

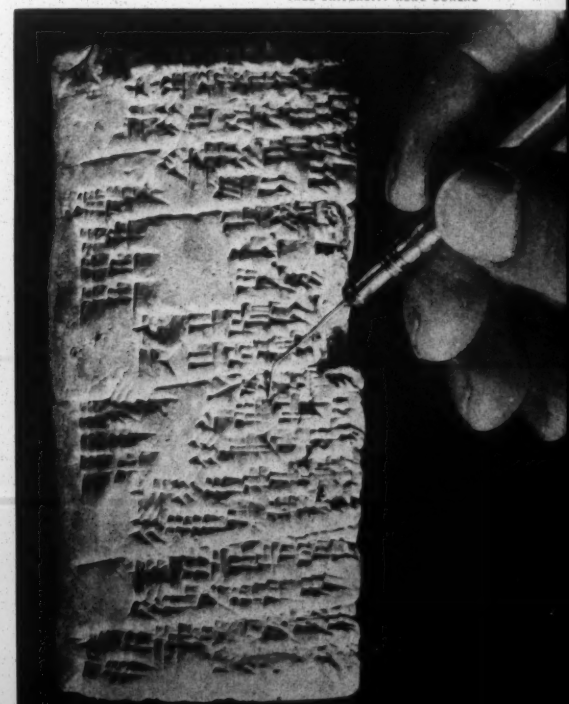
Before him, he realized, lay a schoolchild's diary. In it the lad bewailed a day marked chiefly by the number of canings his teacher had given him. The discouraged boy asked his father to invite the headmaster home for a meal. The parent not only did so, but gave the teacher a new garment and a ring for good measure.

The plan worked perfectly. After dinner the master told the anxious student, "You have carried out well the school's activities, you have become a man of learning."

The first apple polisher belonged to a people who may have been the first to make enduring written records. The existence of the little kingdom of Sumer, between the Tigris and Euphrates rivers, was not suspected by modern scholars until less than a century ago. Through Greek and Hebrew writings, archeologists knew of Assyria and Babylonia and had located them geographically. While digging for relics of these later civilizations they came upon tablets in the Sumerian tongue.

At first scholars thought this new language a variant of Assyrian, invented by priests to hide secrets from the public. Further study revealed a record of an entire civilization that preceded Assyria. The full story hidden behind the Near East's cuneiform characters remains to be told.

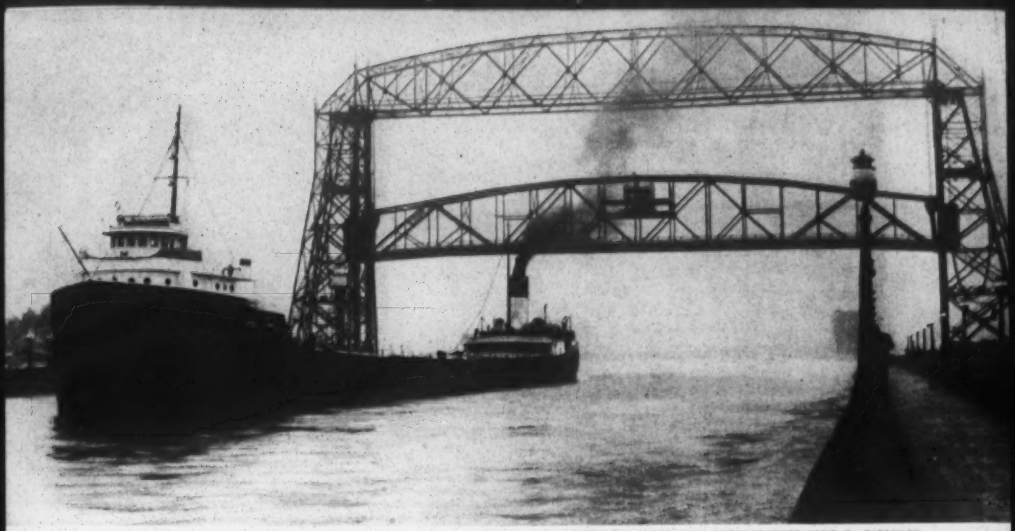
YALE UNIVERSITY NEWS BUREAU



References—Iraq, occupying the area of ancient Sumer, appears on the Society's map of Bible Lands and the Cradle of Western Civilization. "Ancient Mesopotamia: A Light That Did Not Fail," *National Geographic Magazine*, Jan., 1951 (also available in special reprint and as part of the magnificent 356-page volume *Everyday Life in Ancient Times*); "Darius Carved History on Ageless Rock," Dec., 1950; "Sinai Sheds New Light on the Bible," Dec., 1948; "A New Alphabet of the Ancients Is Unearthed," Oct., 1930; "New Light on Ancient Ur," Jan., 1930; GEOGRAPHIC SCHOOL BULLETINS, Dec. 11, 1950, "Ancient Alphabet Grew from Crude Pictures."

Leaf from a Babylon Notebook—Thick clay tablets tell the story in cuneiform (wedge-shaped characters) of Sumer, Assyria, Babylonia.

UMI



NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER

An Ore-Laden Ship Steams out of Duluth's Bustling Port to Eastern Steel Mills

raised the first gristmill. Today Minneapolis, home of General Mills, Inc., is the third-largest flour-milling city in the United States.

By the turn of the century, promoters were advertising in Paris newspapers for men to dig granite near St. Cloud, Minnesota, and to lay tracks for the Great Northern Railroad.

So Minnesota grew, and its citizens do not propose to rest on the laurels of their first 100 years. The State today leads in production of butter. From Duluth each year go a million or more Christmas trees. Waseca manufactures Minnesota-invented two-way radios for police cars and taxicabs. Baudette refines liver oil from the burbot fish.

Minnesota means "sky-tinted water." Ten thousand glimmering lakes and cool woodland trails are today's vacationland for thousands of tourists. Even the Northwest Angle, northernmost point of the United States, is easily accessible for anglers and canoeists.

Culture does not take a back seat. The University of Minnesota at Minneapolis provided the nation's first agricultural training. From its medical school came the Mayo brothers to found the Mayo Clinic, world-famed medical center. James Ford Bell, General Mills founder, recently gave the University his outstanding library on the history of exploration. A recent acquisition is the only known copy of the famed 1507 Waldseemüller globular map on which the name America first appeared (see GEOGRAPHIC SCHOOL BULLETINS, October 11, 1954).

The North Star State's 3,000,000 people are equally divided between city and country. As variable as the Minnesota weather, they are apt to vote Republican in one election, Democratic in another. Tradition has little place where a few generations of Olafsons, Chambrois, Wasyleskis, and Bells have turned a wilderness into a democracy.

References—Minnesota appears on the National Geographic Society's map of the North Central United States. Write the Society, Washington 6, D. C., for a map price list.

"Minnesota Makes Ideas Pay," *National Geographic Magazine*, Sept., 1949; "Mapping the Nation's Breadbasket," June, 1948; "Men, Moose, and Mink of Northwest Angle," Aug., 1947; "Minnesota, Mother of Lakes and Rivers," March, 1935. *School and Library discount price for Magazine issues a year old or less, 50¢; through 1946, 65¢. Send for prices of earlier issues.*

tween mountains and the Caspian Sea in northern Iran semitropical plants thrive and humid soils produce rich crops of tea, fruits, rice, and wheat.

But throughout most of Iran's 630,000 square miles green follows irrigation. Four out of five of Iran's 19,500,000 people depend on that 10 percent of the land which is cultivated and the 15 percent suitable for grazing. Mountain and desert claim the rest.

Four fifths of the irrigation water must be coaxed laboriously from the ground. Fly over the land and you will see mile upon mile of what look like anthills or gophers' holes from the air. These are *kanats*, or shafts. Dirt is brought to the surface through these kanats when a tunnel is hand-dug to carry water from a hillside well to a village.

Only constant labor keeps the desert in check. "When man dies, the tree dies," say Moslem tenant farmers, who keep only one fifth of their produce for themselves. The rest goes to landlords often residing in Tehran, the capital (illustration, cover).

Two great mountain ranges enclosing the central plateau cause Iran's constant struggle for water. Peaks soar 18,000 feet in the Elburz Mountains in the north and wall off moisture from the Caspian Sea. The Zagros Mountains in the west dehydrate winds from the Persian Gulf. Thus most of Iran's 3,000-foot-high heartland gets less than 10 inches of rainfall a year. Salt deserts of central and southeast Iran receive practically none.

But while the mountains take they also give. From western Zagros slopes comes oil—the economic lifeblood of modern Iran—to flow to Abadan refinery. Oil wells dot the land of the Bakhtiari, a nomadic tribe whose wool feeds Iran's leading industry, the home-looming of Persian rugs.

Oozings of gummy black bitumen were known since before the ancient Persian Empire of Cyrus. Alexander the Great's horsemen terrorized their foes with liquid fire, using naphtha and pitch collected during their march through Persia. Natural gas and seeping oils fed eternal flames in temples

Felt-hatted Farmers Thresh Wheat in Central Iran—Oxen tread an endless circle, pulling heavy metal-toothed frame over the grain, a technique unchanged for centuries.

PIX-EMILE G. SERRIES

UMI

Iran's Oil Again Moves to World Markets

At its berth in the muddy Shatt al'Arab, the tanker *British Advocate* settles lower in the water. Black Iranian oil coursing through giant hoses quickly fills one after another of her cargo tanks. Crude-oil stench fills the air. Acrid smoke-haze hangs above Abadan refinery, world's largest, again in operation after three years of virtual shutdown.

A hoarse shout from the bridge and lines are let go bow and stern. The ship moves from the dock and heads downstream. Bound for Ceylon, the 11,500-ton cargo is the first Iranian oil in more than 40 months to move freely to world markets.

Her course reminds this bulletin's writer of his tanker voyages to the Persian Gulf. Approaching through the monsoon-furrowed Arabian Sea, we skirted the forbidding Baluchistan coast. The wind dropped, a wall of 120-degree heat hit us as we swung through the Strait of Hormuz. To starboard, Iran's burning coast line appeared amber and eroded, backed by barren mountains.

In Abadan I asked a man, "Is all Iran as desolate as that?"

"Oh, no, my country is green!"

Journey into Iran and indeed you will find green. It bursts upon you at Isfahan. Accustomed to mile after mile of dusty gray-brown plateau, you come upon groves of trees watered by the meandering Zaindeh Rud. Then suddenly appear the gleaming turquoise domes, the fairy-tale minarets of Isfahan, city of magnificent palaces, pleasure gardens, stately mosques, and wide tree-lined thoroughfares. And tucked be-

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Sea-Mile Adoption Changes Airline Distances

Two months ago New York and San Francisco stood 2,600 air miles apart. Now the straight-line flying distance is only 2,260 miles.

East and west coasts have not suddenly moved closer together, nor have air lines found a short cut. The difference lies in the word "miles." Civil aviation in the United States has switched from statute or "land" miles to nautical miles and knots in reporting distances and speeds. Pilots, control-tower operators, and weathermen now use sea language, as military airmen of all branches have done since 1947.

The nautical mile, 800 feet longer than the familiar legal mile of 5,280 feet, is also the geographical mile of the map maker. By definition it is the length of one minute of arc, 1/60 of a degree, measured on a great-circle girth of the earth. Thus it is based on standard earth measurements rather than human variables.

A knot, a measure of speed rather than of distance, is simply one nautical mile per hour. The term comes from sailing-ship days, from actual knots tied in a vessel's log line to gauge speed.

Since nautical miles are longer than land miles, both distances and speeds in the new terminology seem reduced. A 300-mile-per-hour air liner, for example, goes only about 270 knots. Breaking the sea-level sound barrier of 760 mph (land miles) means a nautical speed of only 670 knots. The great-circle distance around the world is 21,600 nautical miles as against the familiar 25,000 land miles.

Thousands of years passed before men learned to measure accurately great sweeps of the earth's surface. Early peoples took cues from the human body: the length of a foot, the width of a hand, the distance spanned by outstretched arms, so many paces in a day's travel. The "mile" originated in Roman times, from the term *mille passum*, or 1,000 paces. Since the Roman pace was two steps, or approximately five feet, their mile was about 5,000 feet.

NATIONAL GEOGRAPHIC PHOTOGRAPHER DAVID S. BOYER

Nerve Center of Washington's National Airport—A tower of orderly Babel directs all plane traffic at the nation's third-busiest airfield.

of Zoroastrian fire worshippers, later snuffed out by Mohammedan hordes.

Iran's modern petroleum industry was born when an Englishman, William Knox D'Arcy, struck oil in 1908. Iran climbed to fourth-ranking oil producer, possessing one tenth of the world's proved oil reserves. On a flat, barren island at the head of the Persian Gulf rose the industrial colossus of Abadan. A modern city of 175,000 population sprang up around the Anglo-Iranian Oil Company refinery.

Then followed 1951's nationalization of the oil industry. The roots of nationalism went deep into the past. Iran has been a pawn of British and Russian imperialism, therefore sensitive to outside control of industry.

But nationalism run riot was not the full answer. Months of unrest, British blockade, and economic and political crisis sapped Iran's strength. Anarchy, terrorism, the threat of a communist coup stalked the land. Finally a royalist uprising restored order.

A recent agreement signed with eight major foreign oil companies returns Iranian petroleum to world markets. Guaranteed oil revenues will buttress the country's economy and finance an ambitious program to better the lot of its people. Dams and irrigation systems built by oil royalties prove anew that in Iran oil and water *do* mix.

References—Iran is shown on the Society map of Southwest Asia. "We Lived in Turbulent Teheran," *National Geographic Magazine*, Nov., 1953; "We Dwelt in Kashgai Tents," June, 1952; "Journey into Troubled Iran," Oct., 1951; "I Become a Bakhtiari," March, 1947; "Mountain Tribes of Iran and Iraq," March, 1946; "Old and New in Persia," Sept., 1939; GEOGRAPHIC SCHOOL BULLETINS, Oct. 12, 1953, "Poor, Rich Iran Seeks End of Chaos"; May 11, 1953, "Crisis-Ridden Iran Worries Free World."

This December, when summer comes to Antarctica, a U. S. Navy icebreaker will steam toward its shores in round one of the most ambitious assault yet planned on the riddles posed by that southernmost continent. Major expedition units will follow to build a chain of weather stations from frozen waters east of Palmer Peninsula to the South Pole.

Since the early 1770's, when England's Captain James Cook circled the ice-barricaded continent without sighting it, men of many nations have probed its secrets. Admiral Richard E. Byrd followed Amundsen and Scott to the South Pole, flying over it November 29, 1929, during one of two expeditions sponsored by the National Geographic Society.

Byrd repeated the exploit on February 19, 1947, while leading "Operation High Jump," a U. S. Navy expedition mustering 4,000 men, 13 ships, and 20 airplanes. From Little America ground and air teams photomapped and collected data on the world's highest, coldest, windiest continent. Seaplanes charted the coast. Surprisingly, brown hills were found cradling green lakes whose temperatures explorers found "comfortable."

Deposits of oil, copper, iron, gold, silver, and other minerals are indi-

U. S. NAVY, OFFICIAL

Earth's earliest "standard measure" probably was the Egyptian cubit, 20.62 inches, supposedly representing the distance from the elbow to the tip of the middle finger. Saxons, much later, stretched their arms and gave Europe the six-foot fathom. The mariner's "cable length" still is 120 fathoms or 720 feet in the United States Navy.

Furlong is short for "one furrow long," the distance oxen could plow without rest. It's now officially 220 yards. The inch was defined in King Edward II's time as equal to three grains of barley laid end to end. Today's shoe sizes vary by barleycorns, or thirds of an inch.

The modern physicist's angstrom units, some 254,000,000 to the inch, measure light waves. Astronomers use a light year—roughly 6,000,000,000,000 miles—to mark distances between stars and galaxies.

References—*The Round Earth on Flat Paper*, a National Geographic nontechnical monograph on map making from earliest times; "Aviation Looks Ahead on Its 50th Birthday" and "Fact Finding for Tomorrow's Planes," *National Geographic Magazine*, Dec., 1953; "Flying in the 'Blowtorch' Era," Sept., 1950; other articles under *Aviation* in the *National Geographic Magazine Cumulative Index*; GEOGRAPHIC SCHOOL BULLETINS, Dec. 14, 1953, "Fifty Years of Powered Flight."

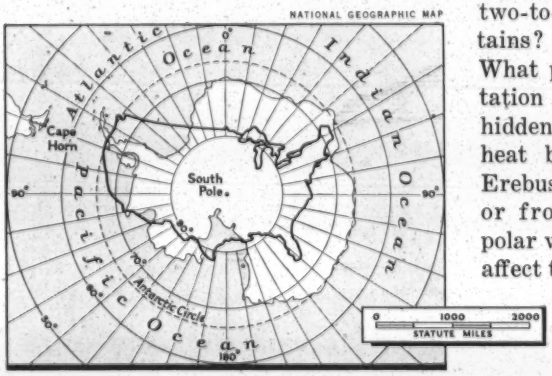
Antarctica: Treasure Chest or Pandora's Box?

Five men fought their way over a 10,500-foot barrier and across the blizzard-swept Antarctic plateau in sub-zero temperatures. Their motor sledges broke down at the start. The Siberian ponies they had counted on, even their dogs, weakened and had to be destroyed. On January 18, 1912, hand-hauling their heavy sledges, the weary men approached the 9,500-foot site of the South Pole.

A dark speck appeared against the white ahead. Their hearts sank. A Norwegian flag whipped in the breeze above a cairn recording that Roald Amundsen, also with four companions, had reached there a month before—December 14, 1911.

"We have turned our backs on the goal . . . and must face our 800 miles of solid dragging—and goodbye to most of the daydreams," wrote Britisher Robert F. Scott in his diary, found months later with his body. His four companions also perished, Scott and the last two but 11 miles from help.

By taking such toll in human life and suffering, Antarctica has guarded its secrets. What mineral wealth lies locked beneath its vast ice fields and two-to-three-mile-high mountains? (Illustration below.) What promise of human habitation is offered by its long-hidden ice-free "oases"? Can heat be harnessed from Mt. Erebus, its 13,200-foot volcano, or from uranium? How do polar winds and ocean currents affect the world's weather?



Antarctica's Area Nearly Equals the United States Plus Europe.

cated beneath the icecap, one to five miles thick. "In the Queen Maud Range, 180 nautical miles from the Pole, I saw a vein filled with enough coal to supply the whole world," said Byrd.

Heated disputes have arisen from conflicting claims some nations make to pie slices of Antarctica. The United States has yet made no claim, recognizes none, concentrates only on exploring this 6,000,000-square-mile icebox, said to unleash half the world's weather. Time will decide its role: world treasure chest or Pandora's box loosing international conflict.

References—Antarctica appears on the Society's World Map. "Our Navy Explores Antarctica," *National Geographic Magazine*, Oct., 1947; "My Four Antarctic Expeditions," July, 1939; "My Flight Across Antarctica," July, 1936; "Exploring the Ice Age in Antarctica," Oct., 1935; "Conquest of Antarctica by Air," Aug., 1930; GEOGRAPHIC SCHOOL BULLETINS, Nov. 17, 1952, "Explorers Prove There Is No Antarctic Ocean."

Antarctic Ice Provides Spacious Dock on Bay of Whales—Cargo slings lower supplies from *U.S.S. Yancey* in 1947. *U.S.S. Merrick* in background.

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